Aquatic Biota

Biological Evaluation

Chetco Bar Area Salvage Project

Rogue River-Siskiyou National Forest

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ATTACHMENT A

Figure 1. Fish Distribution and Project Activities Map – Alternative 2

I. INTRODUCTION

The planning area is located on National Forest System Lands within the Pistol River and Chetco River Creek 5th-Field watersheds. There are six 6th field subwatersheds within the planning area – Boulder Creek, South Fork Chetco River, Nook Creek, Eagle Creek, South Fork Pistol River, and North Fork Pistol River.

This project is located on the Gold Beach Ranger District, Rogue River-Siskiyou National Forest approximately 11 miles Northeast of the city of Brookings, Oregon.

Biological Evaluation Background Information

The Biological Evaluation process (FSM 2672.43) is intended to conduct and document activities necessary to ensure Proposed Actions will not likely jeopardize the continued existence or cause adverse modification of habitat for:

A. Aquatic species listed or proposed to be listed as **Endangered** (E) or **Threatened** (T) or **Proposed** for Federal listing (P) by the National Marine Fisheries Service (NMFS) or US Fish and Wildlife Service.

B. listed as **Sensitive** (S) by USDA, Forest Service.

II. DESCRIPTION OF AFFECTED SPECIES AND HABITAT

A. Threatened, Endangered, and Sensitive Aquatic Species

In compliance with Section 7 of the Endangered Species Act (ESA) and the Forest Service Biological Evaluation (BE) process for **Endangered**, **Threatened, Proposed** or **Sensitive** fish species (Siskiyou LRMP S&G 4-2; page IV-27), the USDA Forest Service Region 6 Sensitive Species List (updated July 13, 2015) was reviewed and field reconnaissance was conducted in regard to potential effects on any of these species by actions associated with the Chetco Bar Area Salvage Project. The results are summarized in the Table 1 below. Also see Attachment A (Fish Distribution and Project Activities Map).

Table 1. Potentially Affected Species, Status, and Habitats Assessed (Pacific Northwest Regional Forester's Sensitive Species List (Updated July 2015)

R6 Regional Forester's Sensitive Aquatic Biota on the Rogue River-Siskiyou National Forest *3rd and 4th columns completed for the Chetco Bar Area Salvage Project*			
Species/Habitat		**Pre-field Review**	**Field Surveys**
Common name	**Scientific Name**	**Existing Sighting or Potential Habitat (Yes/No)**	**Habitat or Species Confirmed (Yes/No)**
ESA Threatened Species			
SONCC coho salmon	*Oncorhynchus kisutch*	Y	Y
OC coho salmon	*O. kisutch*	N	N
S. DPS North American green sturgeon	*Acipenser medirostris*	N	N
S. DPS Pacific eulachon	*Thaleichthys pacificus*	N	N
ESACritical Habitat (CH)			
SONCC coho salmon	*O. kisutch*	Y	Y
OC coho salmon	*O. kisutch*	N	N
MSA Essential Fish Habitat (EFH)			
Coho salmon	*O. kisutch*	Y	Y
Chinook Salmon	*O. tshawytscha*	Y	Y
R6 Forester's Sensitive Species			

R6 Regional Forester's Sensitive Aquatic Biota on the Rogue River-Siskiyou National Forest *3rd and 4th columns completed for the Chetco Bar Area Salvage Project*			
Species/Habitat		**Pre-field Review**	**Field Surveys**
Common name	**Scientific Name**	**Existing Sighting or Potential Habitat (Yes/No)**	**Habitat or Species Confirmed (Yes/No)**
Fish			
Pacific lamprey	*Entosphenus tridenttatus*	Y	Y
KMP steelhead	*O. mykiss*	Y	Y
OC steelhead	*O. mykiss*	N	N
SONCC Chinook salmon	*O. tshawytscha*	Y	Y
Mollusk			
California floater	*Anodonta californiensis*	N	N
Western ridged mussel	*Gonidea angulata*	N	N
Highcap lanx	*Lanx alta*	N	N
Scale lanx	*L. klamathensis*	N	N
Rotund lanx	*L. subrotunda*	N	N
Robust walker	*Pomatiopsis binneyi*	N	N
Pacific walker	*P. californica*	N	N
Insect			
Haddock's Rhyacophilan caddisfly	*Rhyacophila Haddocki*	N	N

***Yes** – The proposed project's potential effects on these species will be further analyzed in this document.
****No** – No further analysis is necessary, and a determination of "No Impact" is rendered.

B. Status of Listed Species, Essential Fish Habitat, and Critical Habitat

Southern Oregon/Northern California Coasts Coho Salmon and Critical Habitat (Threatened)

Southern Oregon/Northern California Coasts (SONCC) coho Evolutionarily Significant Unit (ESU) was listed as threatened on August 10, 1998 (63 FR 42587). This listing was reevaluated and NMFS determined listing SONCC coho was not warranted on January 17, 2006. The listing was once again reevaluated and NMFS determined a listing of threatened was warranted on February 4, 2008 (73 FR 7816). SONCC coho salmon critical habitat was designated as threatened also on February 11, 2008 (73 FR 7816). Final protective regulations for SONCC coho salmon were issued on February 11, 2008 (73 FR 7816). On April 28, 2009 NMFS announced that it was initiating a status review of SONCC coho. On May 26, 2010, NMFS affirmed the listing of the SONCC coho salmon as Threatened (75 FR 29489).

Critical habitat is defined in Section 3(5)(A) of the ESA as "the specific areas within the geographical area occupied by the species Southern Oregon/Northern California Coasts Coho on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection." Section 7 of the ESA prohibits the destruction or adverse modification of designated critical habitat (CCH).

NMFS developed a list of Primary Constituent Elements (PCEs) that are essential for the conservation of SONCC coho, and which are based on the life history of the coho salmon. These PCEs are: freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, nearshore marine areas, and offshore marine areas. These PCEs in concert with SONCC coho distribution data, were used to delineate the spatial extent of the critical habitat. The lateral extent of this designation is limited to the ordinary high water mark (i.e., bankfull elevation). For the purposes of this BE, the PCEs are cross referenced with the respective Habitat Indicators in

Table 2 below.

Table 2. SONCC Coho Critical Habitat Essential Habitat Features and Respective Habitat Indicators

PCEs of SONCC coho Critical Habitat	Habitat Indicator
Freshwater Spawning Sites	Change in Peak/Base Flows, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Substrate
Freshwater Rearing Sites	Change in Peak/Base Flows, Floodplain Connectivity, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Water Quality Indicators, Riparian Reserves, Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Width/depth Ratio, Off-channel Habitat, Streambank Condition
Freshwater Migration Corridors	Physical Barriers, Change in Peak/Base Flows, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Riparian Reserves, Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Width/depth Ratio, Floodplain Connectivity, Off-channel Habitat, Streambank Condition
Estuarine Areas	Physical Barriers, Water Temperature, Sediment/Turbidity, Chemical Contamination/Nutrients, Change in Peak/Base Flows, Water Quality Indicators, Riparian Reserves, Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Width/depth Ratio, Floodplain Connectivity, Off-channel Habitat, Streambank Condition
Nearshore Marine Areas	N/A to RRSNF Actions
Offshore Marine Areas	N/A to RRSNF Actions

Essential Fish Habitat

Interim final rules for Essential Fish Habitat (EFH) under the Magnuson-Stevens Act (16 U.S.C. 1855(b)) were published in the Federal Register/ Vol. 62, No. 244, December 19, 1997 and final rules published in the Federal Register/ Vol. 67, No. 12, January 17, 2002. These rules are pertinent to Chinook salmon and coho salmon habitat within the Southern Oregon Coastal Basin. Essential Fish Habitat (EFH) has been defined by NMFS as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." This definition includes all waters historically used by anadromous salmonids of commercial value.

Because federally listed Threatened fish species and/or critical habitat are present as associated with this project, consultation requirements were conducted in accordance with the ESA (SIS LRMP S&G 4-2).

Pacific Lamprey (Sensitive)

On the RRSNF, Pacific lamprey might occur within the Chetco and Pistol River watersheds, although they have not been documented by RRSNF biologists. For this analysis, the watershed is considered occupied by Pacific lamprey.

The USFWS was petitioned to list the Pacific lamprey (and three other lamprey species) under the ESA in 2003. In 2004, the USFWS found that the petition did not present substantial scientific or commercial information to warrant listing. The petition finding did, however, recognize that Pacific lampreys have declined in the Columbia River basin and in many other parts of their range.

The Pacific lamprey has and continues to face a variety of threats associated with: passage and entrainment at dams and water diversion structures, altered stream flows including dewatering of stream reaches, dredging, chemical poisoning, degraded water quality, poor ocean conditions, disease, over-utilization, introduction and establishment of non-native fishes, predation, and stream and floodplain degradation/simplification (Luzier et al 2009).

KMP Steelhead (Sensitive)

On the RRSNF, Klamath Mountain Province (KMP) steelhead occur within the Chetco and Pistol River watersheds. The KMP steelhead trout distinct population segment (DPS) was proposed as threatened under the ESA on August 9, 1996 (61 FR 41541), but was found not warranted for listing. KMP steelhead is currently listed as a species of concern by NMFS and as a Sensitive Species by the USFS Region 6.

Chinook Salmon (Sensitive)

On the RRS, SONCC Chinook Salmon occurs within the Chetco and Pistol River watersheds. The SONCC ESU was determined to be not warranted for listing under the Endangered Species Act, by the National Marine Fisheries Service on September 16, 1999 (64 FR 50394). This ESU is listed as a Sensitive Species on the USFS Region 6 Special Status Species List.

Other Species (Sensitive)

California floater, Western ridged mussel, highcap lanx, scale lanx, rotund lanx, robust walker, Pacific walker, Haddock's Rhyacophilan caddisfly, Oregon Coast (OC) steelhead are not known to occur or have suitable habitat within proximity to any of the proposed changes included within any of the action alternatives. As such, a **No Impact** determination is rendered and these species will not be discussed further within this document.

C. Description of Habitat/Environmental Baseline

Information used in this analysis includes Geographic Information System data, Aquatic Habitat Inventories, Properly Functioning Condition ratings are based on the NMFS Table of Population and Habitat Indicators, as modified by the Rogue River/South Coast Level 1 Team for the Klamath Province/Siskiyou Mountains.

Action Area

The Action Area, as defined by the Endangered Species Act (ESA), is all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action [50 CFR § 402.02]. The Action Area not only includes the immediate footprint of the harvest and road related activities, but any downstream reaches which may be affected indirectly. The ESA Action Area is also analyzed for Forest Service Sensitive Species.

The proposed action is located within the Chetco River and Pistol River 5th field watersheds. All proposed project activities would occur within the Boulder Creek, South Fork Chetco River, Nook Creek, Eagle Creek, South Fork Pistol River, and North Fork Pistol River 6th field subwatersheds. All potential effects are also expected to occur within the boundaries of these subwatersheds.

This analysis evaluates the direct and indirect potential effects of the proposed actions on SONCC coho salmon, SONCC Chinook salmon, KMP steelhead trout, and Pacific lamprey. Because these species evolved with similar habitat requirements, are co-located within the Action Area, and their range distributions are all included within the extent of coho salmon CH the analysis will focus on the SONCC coho salmon CH distribution. For purposes of this analysis, any effect realized within the range of coho salmon CH would potentially result in an effect to the other anadromous species listed above.

III. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

A full description of the proposed action can be found in the *Chetco Bar Fire Salvage Project Preliminary Environmental Assessment*, Chapter 2.

No Action (Alternative 1)

Under the No Action alternative, no salvage or other connected actions to capture timber value in the matrix land allocations would occur. The economic value of the burned timber would not be recovered. The No Action alternative serves as a baseline against which effects of the action alternatives could be measured and compared.

Proposed Action (Alternative 2)

The Proposed Action was developed to meet the purpose and need for the project. Activities already under permit or contract, or authorized under other NEPA based decisions, would continue.

Salvage Harvest

Salvage harvest is proposed on 4,090 acres within the matrix land use allocation (LUA) in areas that burned 50-100% basal area loss. Treatment areas were developed using a combination of ground reconnaissance, soil and vegetation burn severity models, survey data, and aerial photo analysis. Standing dead or dying trees 10" diameter at breast height (DBH) and greater would be available for harvest. The Forest worked with a local entomologist to apply guidelines from the *Marking guidelines for fire-injured trees in California* (Smith & Cluck. 2011)[1] for predicting mortality of fire-injured trees (See Table 3).

An average of ten snags per acre greater than or equal to 10" DBH would be retained; four of these would be the largest available per acre and the other six would be in the 10 to 20" DBH range. Standing dead or dying snags 10" DBH and less would be retained.

Logging Systems Analyzed

Trees would be removed and harvested by a variety of logging system methods including ground-based logging systems, cable yarding and helicopter. Cable yarding would be used to harvest stands on slopes averaging greater than 30%. A cable yarding system capable of providing one end log suspension and lateral yarding capabilities would be used. Cable yarding requires the use of steel cable for yarding, directional manual falling techniques and use of corridors rather than skid trails. Manual felling and bucking would be required for all cable yarding operations. In areas of the unit with favorable slopes less than 30%, a ground-based mechanical harvesting system may be used to cut and yard timber.

Table 3. Smith and Cluck predicted mortality rate by species and diameter

Species	Diameter	Remove trees with % length of crown scorch greater than or equal to:
Ponderosa/Jeffrey Pine	10"-30"	85%
	30"-40"	55%
	40-50"	35%
Sugar Pine	10-60"	55%
Incense Cedar	10-60"	85%
White Firs	10"-35"	80%
	35"-60"	65%
Red Firs	6"-40"	75%
Lodgepole Pine	<10"	5%
	15"-20"	40%
Species	**Diameter**	**Remove trees with volume % of crown scorch greater than or equal to:**
Douglas Fir	10"-40"	70%

[1] (Smith, S.L. and D.R. Cluck. 2011) Marking guidelines for fire-injured trees in CA. USDA Forest Service, Region 5, Forest Heath Protection. Report # RO-11-01. 11 p. (available on the internet for Region 5 Forest Health Protection)

Table 4. Proposed Action Logging Systems

Logging Systems	Acres
Helicopter	1,093
Skyline	2,378
Tractor	619
Total	**4,090**

Created Slash Treatments

Some created slash would be left within the treatment units to aid in soil stabilization, refer to the design criteria for a complete description. Material deemed to be in excess of soil resource needs would be treated to reduce the overall amount of slash remaining on site. Much of the existing surface fuels were consumed during the fire, activity created slash would be treated by one or a combination of methods. Yarding tops to landings for utilization or disposal by burning is one method. Machine or landing pile burning would occur during the first burning window after piling is complete and slash has cured. Another method proposed is removal of the slash for utilization, depending on market conditions. Other treatments include hand piling and burning, machine piling and burning, jackpot burning. These treatments reduce the surface fuel load generated as a result of harvest activities. All units include treatments to reduce the surface fuel levels to mitigate the possible increase in future fire activity.

Road Activities

The following road activities would occur within the project footprint:

- Road maintenance activities
- Road reconstruction activities
- Culvert replacement – ditch relief culvert
- Dust abatement
- Opening and reclosing ML1 roads
- Rainbow Creek culvert (1407.150)
- Erosion Control

Road Maintenance Activities

Forest roads used for salvage would have road maintenance activities to varying degrees, dependent upon severity of road damage, potential for erosion and sediment production, and designed maintenance level. Most commonly, maintenance would consist of danger tree removal and brushing for sight distance, although some ground-disturbing activity may be necessary. The following work is included in the maintenance requirements for roads:

- Blade and shape road including existing drain dips and grade sags
- Constructing water bars/cross ditches
- Roadside brushing
- Removing danger trees
- Seeding and erosion control
- Spot rocking in wet areas of the roadway
- Snow removal
- Minor realigning of road junctions
- Cleaning culverts and catch basins
- Ditch cleaning

- Removing slides and excess material from roadway
- Placing fill material for major rutting in the roadway
- Installation of minor drainage features
- Watering roadway for dust abatement
- Clearing and grubbing of roadway
- Resurfacing roads

Temporary Roads

Temporary roads are roads authorized by contract, permit, lease, or other written authorization, or emergency operation not intended to be part of the forest transportation system and not necessary for long-term resource management. Temporary roads are not intended to be included as part of the forest road atlas, as they are managed by the projects or activities under which they are authorized and decommissioned at the conclusion of the authorized activity. No new temporary roads would be constructed within riparian reserves. Temporary roads would be closed and restored after salvage and related activities are complete. About 13.5 miles of temporary roads would be constructed and rehabilitated after use.

Road Reconstruction

Reconstruction requirements would be used for roads requiring the following work:

- Major realignment or repair
- Widening of roadbed to meet safety standards
- Constructing drain dips

New Road Construction

An activity that results in the addition of forest classified road miles (36 CFR 212.1). None of the alternatives evaluated here propose any new road construction.

Log Haul on Roads

Approximately 6.3 miles of closed roads would be opened for log haul; and roads would be re-closed at completion of project. Approximately 104.5 miles of open roads would also be used for log haul. An additional 26.4 miles of alternate haul routes have been identified in the event of road failures.

Planting

Following salvage harvest, the same 4,090 acres would be surveyed for natural regeneration. If natural regeneration is determined not to be adequate to comply with the NFMA five-year regeneration requirement to achieve stocking levels consistent with management objectives, site-specific appropriate tree species mix would be planted by hand.

Site prep for tree planting includes:

- Lop and scatter of existing down wood to open up planting sites using chainsaw as needed.
- Cutting competing shrubs within a 4-foot radius of planting sites using chainsaw as needed.
- Removing ground vegetation within a 24-square inch planting site down to mineral soil (i.e. scalp) using a hoe dad.

Trees would be manually planted with a hoe dad. Additionally, planted trees exhibiting wildlife browsing can have vexar tubing or netting installed to protect the seedling's terminal leader from animal damage.

Post planting stocking surveys would also be conducted the first and third years following initial planting to determine tree survival and determine replanting needs. Replanting may occur when deemed necessary.

Alternative 3

Alternative 3 was developed to address the key issue that salvage logging within unmanaged stands may affect the complex, early seral habitat with biological legacies (large snags and downed wood) that these areas provide. Activities already under permit or contract, or authorized under other NEPA based decisions, would continue.

Salvage Harvest

Salvage harvest is proposed on 1,868 acres of managed stands within the matrix land use allocation (LUA) in areas that burned 50-100% basal area loss. Treatment areas were developed using a combination of ground reconnaissance, soil and vegetation burn severity models, survey data, and aerial photo analysis. Standing dead or dying trees 10" diameter at breast height (DBH) and greater would be available for harvest. The Forest worked with a local entomologist to apply guidelines from the *Marking guidelines for fire-injured trees in California* (Smith & Cluck. 2011)[1] for predicting mortality of fire-injured trees (See Table 3).

An average of ten snags per acre greater than or equal to 10" DBH would be retained; four of these would be the largest available per acre and the other six would be in the 10 to 20" DBH range. Standing dead or dying snags 10" DBH and less would be retained.

Table 5. Alternative 3 Logging Systems

Logging Systems	Acres
Helicopter	288
Skyline	1,244
Tractor	336
Total	**1,868**

Logging Systems Analyzed

Trees would be removed and harvested by a variety of logging system methods including ground-based logging systems, cable yarding and helicopter. Cable yarding would be used to harvest stands on slopes averaging greater than 30%. A cable yarding system capable of providing one end log suspension and lateral yarding capabilities would be used. Cable yarding requires the use of steel cable for yarding, directional manual falling techniques and use of corridors rather than skid trails. Manual felling and bucking would be required for all cable yarding operations. In areas of the unit with favorable slopes less than 30%, a ground-based mechanical harvesting system may be used to cut and yard timber.

Created Slash Treatments

Some created slash would be left within the treatment units to aid in soil stabilization, refer to the design criteria for a complete description. Material deemed to be in excess of soil resource needs would be treated to reduce the overall amount of slash remaining on site. Much of the existing surface fuels were consumed during the fire, activity created slash would be treated by one or a combination of methods. Yarding tops to landings for utilization or disposal by burning is one method. Machine or landing pile burning would occur during the first burning window after piling is complete and slash has cured. Another method proposed is removal of the slash for utilization, depending on market conditions. Other

[1] (Smith, S.L. and D.R. Cluck. 2011) Marking guidelines for fire-injured trees in CA. USDA Forest Service, Region 5, Forest Heath Protection. Report # RO-11-01. 11 p. (available on the internet for Region 5 Forest Health Protection)

treatments include hand piling and burning, machine piling and burning, jackpot burning. These treatments reduce the surface fuel load generated as a result of harvest activities. All units include treatments to reduce the surface fuel levels to mitigate the possible increase in future fire activity.

Road Activities

Road activities under Alternative 3 are the same as those described above under the Proposed Action alternative with the following differences in miles of activities:

Temporary Roads

About 9.36 miles of temporary roads would be constructed and rehabilitated after use.

Log Haul on Roads

Approximately 6.3 miles of closed roads would be opened for log haul; and roads would be re-closed at completion of project. Approximately 104.5 miles of open roads would also be used for log haul. An additional 26.4 miles of alternate haul routes have been identified in the event of road failures.

136.9 miles of haul routes.

Planting

Following salvage harvest, the same 1,868 acres would be surveyed for natural regeneration. If natural regeneration is determined not to be adequate to comply with the NFMA five-year regeneration requirement to achieve stocking levels consistent with management objectives, site-specific appropriate tree species mix would be planted by hand.

Site prep for tree planting includes:

- Lop and scatter of existing down wood to open up planting sites using chainsaw as needed.
- Cutting competing shrubs within a 4-foot radius of planting sites using chainsaw as needed.
- Removing ground vegetation within a 24-square inch planting site down to mineral soil (i.e. scalp) using a hoe dad.

Trees would be manually planted with a hoe dag. Additionally, planted trees exhibiting wildlife browsing can have vexar tubing or netting installed to protect the seedling's terminal leader from animal damage.

Post planting stocking surveys would also be conducted the first and third years following initial planting to determine tree survival and determine replanting needs. Replanting may occur when deemed necessary.

IV. DESCRIPTION OF PROJECT ELEMENTS AND DESIGN CRITERIA

A. Overview of Proposed Project Actions

The actions of the project alternatives can be divided into four Project Elements (PE):

1. *Salvage Harvest, Yarding, and Timber Haul*
2. *Fuels Treatments*
3. *Road Maintenance, Temporary Road Construction and Decommissioning*
4. *Planting Activities*

B. Project Elements and Project Design Criteria

1. Silvicultural Treatments

a. Salvage harvest

Salvage harvest is proposed in both managed stands and natural stands. These stands are primarily even-aged or are dominated by two distinct age classes as a result of single storied plantations or fire disturbance. These stands are primarily dominated by Douglas-fir. Treatments aim to enhance structural and species diversity, and result in a variety of stand densities for development into late-successional conditions to meet Aquatic Conservation Strategies (USDA, USDI 1994). The desired variability and structural complexity from this treatment is explained under *Density Management* (see silviculture specialist report). Treatments would retain components of understory and intermediate trees for complex structural development. Thinning would be distributed across canopy layers and tree classes, create canopy gaps, and vary in tree sizes and species.

b. Yarding Systems

Three yarding systems are proposed to accomplish salvage harvest objectives – ground based, skyline, and helicopter. For more information about these systems please reference *Chetco Bar Fire Salvage Project Preliminary Environmental Assessment*, Chapter 2.

c. Timber Haul

Haul route for excess or sale material would use FSR 1376, a paved road that exits the Chetco River Watershed to the South. The entire haul route below the South Fork Chetco River crossing is on a paved road. Wet weather haul will occur only under specific weather and conditional criteria which are identified in the *Chetco Bar Fire Salvage Project Preliminary Environmental Assessment*, Chapter 2.

2. Fuels Treatments

Activity Fuels Treatments

Activity fuels treatment refers to the slash and accumulated fuels loading resulting from the proposed commercial harvest action. While there may be some slash from previous harvesting or from natural conditions, the majority of material would be generated through harvesting at this time. There are several techniques available to accomplish reduction of activity fuels, when resulting levels are predicted to be greater than that which equates to an acceptable fuels risk and fire hazard.

Activity fuels treatments proposed for this project include only those that are predicted to be necessary to obtain a resultant and acceptable fuels/fire risk.

3. Road Maintenance, Temporary Road Construction and Decommissioning, and Road Reconstruction

a. Road Maintenance

This activity includes several routine related activities which maintain drainage, cuts and fills and surfacing of the road prism to accommodate light and commercial road traffic; while maintaining the integrity of the road facility and minimizing effects to natural resources adjacent to the road. Much of this work is done with a motor grader, dump trucks and backhoe and includes travel way surface maintenance, drainage ditch maintenance, culvert cleaning, surface rock replacement, shaping of the roadway and ditches by blading, removal of slough materials, compacting and other mechanized and hand work.

It is estimated that road maintenance would be needed on the road system utilized for this project, over the lifetime of the project.

b. Temporary Road (Access) Construction & Decommissioning

Temporary roads include those roads needed only for the purchaser's use, such as roads used to haul timber from landings to permanent National Forest System roads. The Chetco Bar Area Salvage Project may need other new temporary road construction for candidate stand access if it minimizes resource damage. These roads would be built and removed by the operator as part of the Forest Service timber sale or stewardship contract.

c. Road Reconstruction

Reconstruction involves maintenance and improvements to existing roads, to make them suitable for logging equipment and harvest treatment access. Reconstruction involves restoring a road to operational condition through the use of various repairs.

Road repairs could have one or more of the following work items: removing fallen trees, cleaning out culvert inlets, removing and disposing of small cut slope slides, falling danger trees, replacing minor amounts of road surfacing, replacing, adding additonal drainage structures, etc. Treatments could include grading, clearing, restoring road width loss, or stabilizing a cut or fill (embankment) slope that was lost due to storm damage, by placing riprap materials (large boulders) against existing slopes, and may include widening and surface rock replacement.

V. EFFECTS OF ALTERNATIVES

A. Effects of the No Action Alternative (Alternative 1)

With this alternative, no activities would occur; there would be no direct or indirect effects from this alternative. With no direct or indirect effects, there can be no cumulative effects.

B. Effects of the Proposed Action (Alternatives 2 and 3)

As stated earlier, the proposed activities under the Chetco Bar Area Salvage Project were split into four project elements: 1) Timber Falling, Yarding, and Haul 2) Road Maintenance, 3) Fuels Treatment, 4) Road Maintenance, Temporary Road Construction, Landing Construction/Reconstruction.

Direct Effects

The Proposed Action for Chetco Bar Area Salvage Project has no direct effects to aquatic biota because there are no instream activities proposed within the range of any federally listed threatened or endangered species nor within the range of any Forest Service Sensitive species.

Indirect Effects

The effects described here have been evaluated by a professional hydrologist for the Chetco Bar Area Salvage Project. An in-depth discussion of potential effects to stream channels, temperature, sediment, Riparian Reserves, and wood recruitment can be found in Chapter 3 of the *Chetco Bar Area Salvage Project Environmental Assessment* under the Hydrology section.

Temperature

Stream temperature is protected under the "Clean Water Act" and State Water Quality Standards. On March 1, 2004, new water temperature standards were adopted by the State of Oregon. Water Temperature Standards are found in ORA, Chapter 340, Division 041, Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon, 340-041-0028, Temperature. The temperature policy of the Commission is to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. Several streams within the Chetco Fire area are listed as water quality limited (303 (d), "Water Quality Limited with Regards to Stream Temperature" (refer to **Error! Reference source not found.** for specific streams).

Stream temperature is affected by channel form and by shading from channel morphology and riparian vegetation. Increased sediment loading can cause the channel to become wider and shallower, exposing more surface area to solar radiation and resulting in higher stream temperatures. It is unlikely that any action alternative will alter a stream channel enough to affect the stream temperature in any of the watersheds.

Fire killed trees in the riparian area still provide some stream shade. Removal of riparian vegetation that allows additional solar energy to reach the stream contributes to elevated stream temperature (Rishel et al. 1982; Brown, 1983; Beschta et al., 1987).

All action alternatives maintain a no cut buffer within at least one or two SPT (175 or 350 feet) on fish bearing and non-fish-bearing streams to protect all remaining stream shade. Stream shade will not be altered or reduced from the implementation of this project and therefore no indirect effects will occur related to stream shade and temperature.

Sediment and Turbidity

Soil disturbance from management activities can cause sediment to be delivered to a stream. Sediment delivered to a stream most often is comprised of both suspended sediment (silt and clays) and coarser materials (sand and gravels) that are transported as bedload. Suspended sediment that can affect water clarity is usually quickly transported through the stream system.

Sediment can either be delivered by mass wasting or surface erosion. Mass wasting can deliver large amounts of sediment in a short time. Following mass wasting to a stream, there is an accompanying increase in turbidity from fine sediment. Surface erosion delivers a smaller amount of sediment over a longer time period. Rather than affecting whole stream systems, such as mass wasting, fine sediment from erosion usually causes localized increases in turbidity or it is so small that it is undetectable.

Harm may include habitat modification or degradation that actually kills or injures an aquatic species by substantially impairing essential behavior patterns such as breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 217.12). Therefore, indirect adverse effects are those that reduce fish growth and ultimately survival through changing the quality or quantity of physical (e.g. temperature, cover, pool depth, spawning gravels), chemical (e.g. pH), or biological (e.g. decreased prey availability) parameters. Indirect effects that improve habitat parameters could also be beneficial to the species.

In general, roads and their use can have adverse effects to fish habitat through a variety of mechanisms including urbanization, industrial development, habitat fragmentation, and sediment and chemical delivery. Forest roads built for timber harvest and access to other natural resources can be abundant sources of sediment to aquatic systems, both through increased surface erosion, landslide risk, and drainage density (Cederholm et al. 1980; Furniss et al. 1991).

Specifically, increased sediment production in stream systems has been shown to adversely affect Pacific Northwest salmonid species through reduction in gravel permeability and reduced egg to fry survival (Cederholm et al. 1980; Furniss et al. 1991). Further, sediment can reduce macroinvertebrate production and fill pools, reducing habitat quantity and salmonid food availability (Suttle et al. 2004; Harvey et al. 2009). A direct linkage also exists between sediment supply and stream habitat indicators such as gravel permeability and pool depth. Likewise, inverse relationships exist between sediment-related stream habitat indicators and fish survival (Suttle et al. 2004; Harvey et al. 2009).

Three severely burned tributaries to the Illinois River as well as the Illinois River were measured in 2002 and 2003 to determine whether any changes in turbidity occurred following the first winter after the Biscuit Fire. The winter following the Biscuit Fire was normal with one storm of magnitude of between a 2 and 5 year event that occurred the last week of December and first week of January. No increase in turbidity was noted in the fire area. The Illinois River below Six Mile Creek showed an increase on December 16 but the sediment source was upstream of the fire area.

Turbidity was also monitored following the 1987 Silver Fire for the effects of wildfire and for subsequent salvage logging. For two years following the Silver Fire turbidity was monitored, a period when sediment are at their peaks following a wild fire. Approximately 40 % of Silver Creek and 37% of Indigo Creek burned in that fire. Monitoring results showed that the maximum average monthly turbidity at the mouth of Silver Creek was measured at under 5 Nephelometric Turbidity Units (NTUs) in January 1990, about two years after the Silver fire. The maximum measured turbidity for Indigo Creed was 12-13 NTUs in January and February 1989. A summary of the data concluded: "There have been no noticeable effects in increases in turbidity or sediment" and "Turbidity does not appear to be a significant area of concern" (Kormeier, 1995).

The Chetco Bar Area Salvage Project will implement full riparian reserve no cut buffers of 175' on non-fish bearing stream and 350' on fish bearing streams. By implementing the mandatory full buffer widths on all streams as part of the project's design criteria, there would be no increase in fine sediment delivery to any stream or associated increase in turbidity from salvage harvest and yarding activities.

No new temporary roads would be constructed in Riparian Reserves or across any stream channels, therefore temporary road construction does not have a mechanism to contribute sediment to the aquatic system. Road maintenance associated with the project will be required to follow all criteria in the *National Best Management Practices for Water Quality Management on National Forest System Lands* (USDA, 2012) to mitigate any potential for road related sediment from entering any watercourse or ditch connected to the stream network.

Proposed road maintenance would reduce road-derived sediment generated during increased road use over the life of the project. Road-derived sediment would be directed onto the forest floor through cross

drains where it would be filtered before reaching stream channels. No-harvest riparian buffers, intermittent stream status, and proximity to fish bearing streams would be sufficient to prevent any sediment delivery from temporary spur road construction and road maintenance activities to downstream occupied habitat.

Haul routes will be sufficiently rocked and PDCs related to haul will implemented to eliminate the chance of road derived sediment from reaching occupied anadromous habitat. These PDCs include limiting haul due to precipitation events and/or road damage from heavy use.

Based on the above information, no sedimentation with a connection to stream channels is expected to occur from any project activities within proximity to anadromous fish habitat. Therefore, project activities will not result in any indirect effects to aquatic TES species in the project area.

Large Wood

The lack of large wood is an important shortcoming of aquatic habitat in the Chetco River and its tributaries. In streams large wood is an important component to add channel complexity along channel margins, in side channels, at heads of point bars, and at heads and margins of islands. This wood plays a critical role in providing over-wintering habitat for salmonids as well as spring and summer habitat for salmonid fry. Large wood is crucial to retaining fine organic matter and thereby trapping nutrients and providing substrate for aquatic macroinvertebrate communities.

Knowing exactly how much large wood "should" be present in higher order main stem channels is nearly impossible to determine because pristine stream and river systems of this size on which to base a comparison are rare to nonexistent along the Pacific coast (Bisson et al. 1987). Primary processes of large wood input to Chetco River are from streamside trees falling into the stream, however inputs also include transport from upstream, streamside debris avalanches, earthflows, or debris torrents from tributaries (Bisson et al. 1987). Due to the size and intensity of the Chetco Bar Fire, it is reasonable to assume that wood recruitment to stream channels will be greatly accelerated over the next several decades and wood stocking levels will meet or exceed historic wood concentrations in fire affected channels.

Large wood recruitment over time will be maintained and enhanced by the same strategy employed to protect stream shading as described above in the Temperature section. The majority of instream large wood in Chetco River tributaries originates within 70 feet of stream channels. The minimum no-cut buffer in Riparian Reserves around perennial streams with trees greater than 100' tall would be 175' or greater, ensuring that wood recruitment rates over time will be completely unaffected by project activities. Because there is no mechanism to affect wood recruitment rates by project activities with minimum buffers of 175' on all streams, there will be no indirect effects to wood recruitment in streams found within the project area.

Cumulative Effects

Past, present, and future activities have the potential to work synergistically with the proposed activities in the Upper Chetco River. Past, present, and reasonably foreseeable future activities that have occurred on National Forest System lands are documented in the *Chetco Bar Area Salvage ProjectEnvironmental Assessment* (EA, Chapter 2).

There are no direct or indirect effects identified to aquatic resources from proposed activities associated with the Chetco Bar Area Salvage Project. Because there are no effects associated with proposed project activities to aquatic resources, there can be no negative cumulative effects.

VI. SUMMARY AND COMPARISON OF ALTERNATIVES

Table 6. Comparison of Effects to Aquatic Species by Alternative and Activity Type

Alternative	Timber Falling, Yarding, and Haul	Fuels Treatment	Road Maintenance, Construction and Decommissioning	Stream Enhancement
1	Neutral	Neutral	Neutral	Neutral

2	Neutral	Neutral	Neutral	Neutral
3	Neutral	Neutral	Neutral	Neutral

The No Action Alternative would not alter the project area on National Forest System land. Thus, a neutral effect to aquatic species or habitat would occur.

Specific to Alternative 3, there would be fewer fire killed trees treated from "Salvage harvest" as compared to Alternative 2, however the same system of PDCs would be employed so all potential effects to TES aquatic biota would be disconnected from the aquatic system.

Effects to Endangered, Threatened, Proposed or Sensitive aquatic species are similar under all of the Action Alternatives. This is due to the same site specific design elements being included in all of the action alternatives.

VII. CONCLUSIONS AND DETERMINATIONS

Alternative 1 – No Action

Alternative 1 would have no direct, indirect or cumulative effects to SONCC coho salmon, SONCC coho CH, Pacific eulachon, North American green sturgeon, and Essential Fish Habitat since there is no action, therefore there is **No Effect** to these species/habitats.

Alternative 1 would have no direct, indirect or cumulative effects to California floater, Western ridged mussel, highcap lanx, scale lanx, rotund lanx, robust walker, Pacific walker, Haddock's Rhyacophilan caddisfly, Oregon Coast (OC) steelhead, and SONCC Chinook salmon since there is no action. Therefore, a "***No Impact****"* determination is rendered.

Alternatives 2 and 3 – Action Alternatives

There are no direct, indirect, or cummulative effects from Alternatives 2 and 3. As a result, project activities would have **No Effect** to SONCC coho salmon, SONCC coho CH, Pacific eulachon, North American green sturgeon, and Essential Fish Habitat.

These Alternatives would have **No Impact** to KMP steelhead, Pacific lamprey, SONCC Chinook salmon, California floater, Western ridged mussel, highcap lanx, scale lanx, rotund lanx, robust walker, Pacific walker, and Haddock's Rhyacophilan caddisfly because these species are not known to occur, do not have suitable habitat within proximity to any of the proposed activities, or project activities are disconnected from the aquatic system within their range distribution.

Table 7. Summary of Conclusion of Effects

Endangered, **Threatened, Proposed** or **Sensitive Species**	**1**	**2**	**3**
SONCC coho salmon	NE	NE	NE
SONCC coho CH	NE	NE	NE
EFH – coho	NE	NE	NE
EFH – Chinook	NE	NE	NE
KMP steelhead	NI	NI	NI
Pacific lamprey	NI	NI	NI
SONCC Chinook salmon	NI	NI	NI
California Floater	NI	NI	NI
Western ridged mussel	NI	NI	NI
Rotund lanx	NI	NI	NI
Highcap lanx	NI	NI	NI
Scale lanx	NI	NI	NI
Robust walker	NI	NI	NI
Pacific walker	NI	NI	NI
Haddock's Rhyacophilan caddisfly	NI	NI	NI

NE = No Effect

NI = No Impact
MIIH = May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species

VIII. LITERATURE CITED

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ATTACHMENT A **Fish Distribution and Project Activities Map – Alternative 2**